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STUDIES ON THE WEED FLORA OF CULTIVATED LAND IN EGYPT

1. PRELIMINARY SURVEY

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A few published accounts deal with the weed flora of Egypt: Simpson (1932), Tadros and Atta (1958), Boulos (1966 & 1967), Boulos and El Hadidi (1967), El Hadidi and Ghabbour (1968), Saarisalo (1968) and El Hadidi, Kosinová and Chrtek (1970).

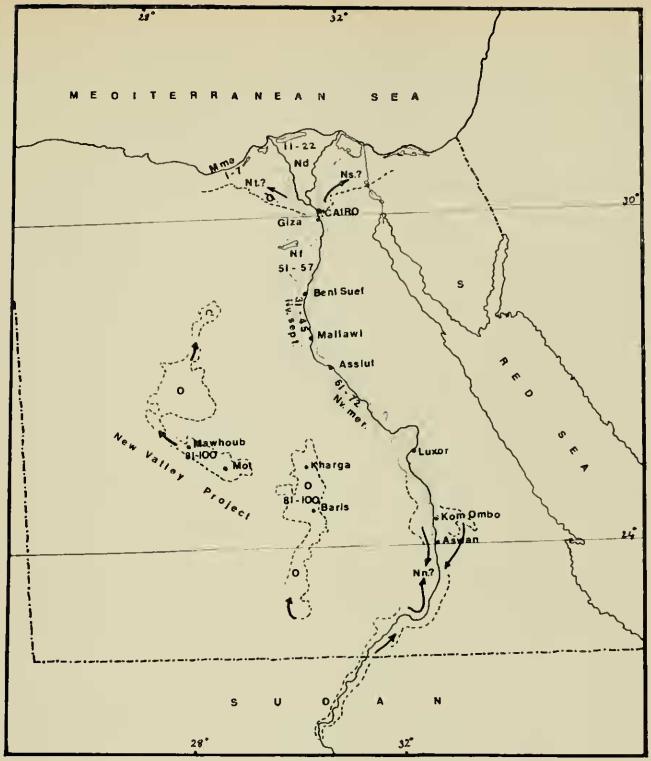
These publications deal with the weeds from a general point of view, among these were included certain groups of plants which are characteristic to other habitats such as plants growing in neglected and waste lands, also those growing along the banks of irrigation canals and drains.

The weed flora of the cultivated land in Egypt deserves a special study, as weeds are associated with a system of agriculture that has certain characteristics:

1) The perennial system of irrigation is a principal feature of agriculture. Two crops are grown in a seasonal sequence: a summer crop and a winter crop. Among each set of crops, there is at least a cereal and a leguminous or an oil plant. Weeds are generally annuals of either summer or winter growth. It follows that a crop rotation is accompanied by a weed rotation.

2) Most of the cultivated land of Egypt, which is farmed since ancient times, belongs phytogeographically and edaphically to more or less well-distinguished regions. The largest part of the cultivated land belongs to the so-called Nile region (N, in map), which owes its existence to the alluvial deposits of the Nile. This region extends from the south (as Nv sub-region) northwards (as Nd subregion) giving the chance to the Mediterranean element to show its influence on the flora of this region. The western expansion of the Nile region, the Faiyum area (Nf sub-region), was originally a marshy depression in the Libyan desert and was cultivated since a long time ago. The Faiyum region still keeps traces of marsh vegetation.

Other parts of the cultivated land depend on rain or underground water. Rain-fed agriculture in Egypt is restricted to winter and spring months and is confined to a narrow strip of land (about 30 km wide) that runs parallel to the Mediterranean coast and belongs phytogeographically to the



Mediterranean region (Mma, in map). The floral elements of this region have their special attributes and are referred to as "barley fields weeds" (Tadros and Atta 1958). Underground water provides for permanent irrigation in the Oases depressions of the Libyan desert. The weed flora of the Oases comprises apart from the elements characteristic to these isolated depressions, desert plants and other weeds introduced with new crops.

Rainfall and underground water are the source of irrigation in a group of small oases that exist among the mountaineous block of Southern Sinai. The weed flora in the fields of these oases include several endemics together with species which belong to native and foreign elements (El Hadidi, Kosinová and Chrtek 1970).

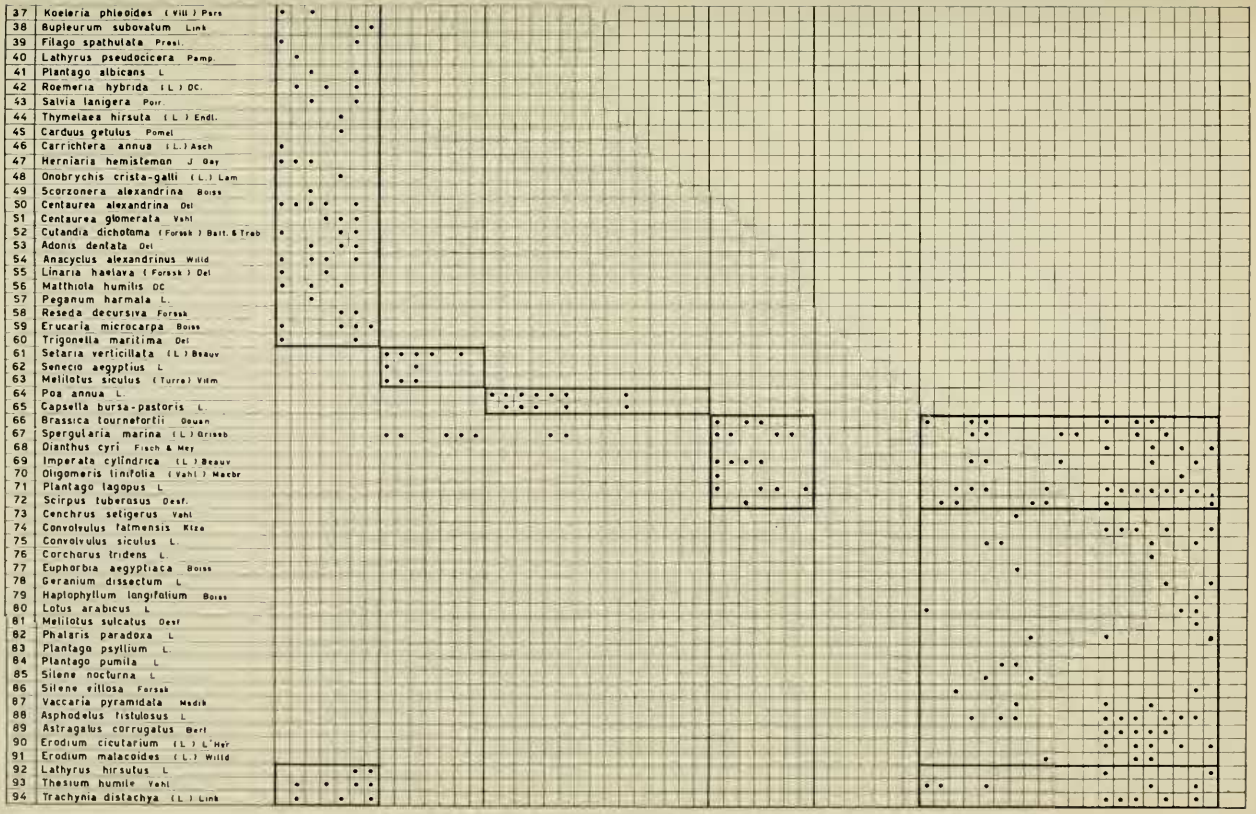
3) The increase in population in the country required the expansion of the cultivated land. Reclamation of desert plains took place along the Nile region around Kom Ombo (Nv mer., New Nubia project), and on both sides of the delta (westwards, Tahrir project; eastwards, Salhia project). Within the delta, the northern part previously occupied by marshes, is almost completely reclaimed and constitutes the province of Kafr El Sheikh which in-

TABLE 1

Records of distribution of winter weeds. (Feb. – May 1967).

H = Hordeum vulgare L.
M = Medicago sativa L.
T = Triticum vulgare Vill.
t = Trifolium alexandrinum L.
V = Vicia faba L.

Region	Locality		Locality Number	Crop	1 Melilotus indicus (L.) All.	2 Cynodon dactylon (L.) Pers.	3 Sonchus oleraceus L.	4 Chenopodium murale L.	5 Trifolium resupinatum L.	6 Anagallis arvensis L.	7 Chenopodium album L.	8 Brassica nigra (L.) Koch	9 Polypogon monspeliensis (L.) Desf.	10 Convolvulus arvensis L.	11 Senecio desfontainei Druce	12 Medicago hispida Gaertn.	13 Lolium perenne L.	14 Avena fatua L.	15 Rumex dentatus L.	16 Beta vulgaris L.	17 Vicia sativa L.	18 Ammi majus L.	19 Calendula micrantha Tin. u. Guss.	20 Euphorbia peplus L.	21 Trigonella hamosa L.	22 Scorpiurus muricata L.	23 Erigeron crispus Pourr.	24 Cichorium pumilum Jacq.	25 Vicia calcarata Desf.	26 Malva parviflora L.	27 Emex spinosus (L.) Campd.	28 Solanum nigrum L.	29 Polygonum equisetiforme Sibth. u. Sm.	30 Silene rubella L.	31 Achillea santolina L.	32 Carthamus mareoticus Del.	33 Chrysanthemum coronarium L.	34 Convolvulus althaeoides L.	35 Echium sericeum Vahl	36 Eryngium creticum Lam.
	Occurrence (%)				71	70	67	57	52	51	48	46	44	40	34	32	32	27	26	24	22	22	22	22	22	20	20	20	18	16	14	11	11	8						
O.	Dakhla, Mawhoub	15.3	100	T	•	•	•		•	•		•	•		•		•			•			•			•	•													
	Dakhla, Bedkhlou	15.3	99	M	•	•	•	•		•				•	•																		•							
	Dakhla, Reshde	15.3	98	V		•				•					•		•					•	•			•														
	Dakhla, Reshde	15.3	97	T	•	•		•	•	•		•						•					•																	
	Dakhla, Mout	15.3	96	V	•	•	•					•			•		•			•						•						•								
	Dakhla, Asmant	15.3	95	T	•	•	•	•	•		•	•	•				•						•						•	•		•								
	Dakhla, Balat	15.3	94	T	•	•	•	•	•	•		•				•							•			•			•	•										
	Dakhla, Teneda	17.3	93	T	•	•	•	•	•	•		•			•		•	•								•														
	Kharga - Baris, Nasser	19.3	92	T	•	•	•			•	•		•									•																		
	Kharga - Baris, Nasser	19.3	91	T	•	•	•				•		•				•																							
	Kharga - Baris, Nasser	19.3	90	V	•		•				•		•				•									•	•						•							
	Kharga - Baris, Genah	19.3	89	T	•	•						•				•	•	•																						
	Kharga - Baris, Genah	19.3	88	T		•	•	•	•				•	•		•				•	•	•											•							
	Kharga - Baris, Genah	19.3	87	T	•	•	•	•		•						•	•								•		•		•											
	Kharga, resthouse	13.3	86	T					•		•											•			•							•								
	Kharga, resthouse	13.3	85	T	•	•	•			•							•	•					•				•													
	Kharga, resthouse	13.3	84	T	•		•								•		•																							
	Kharga, Hibis temple	17.3	83	T	•					•			•																											
	Kharga, Mahariq	18.3	82	T	•	•				•		•																	•											
	Kharga, Mahariq	18.3	81	T	•	•	•										•						•			•														
Nv. mer.	Kom Ombo, temple	19.4	67	T	•	•	•	•			•	•	•			•			•						•															
	Kom Ombo, temple	19.4	66	T	•	•	•	•			•	•	•	•											•					•										
	Kom Ombo, temple	19.4	65	T	•	•	•							•											•	•	•													
	Kom Ombo, temple	19.4	64	T	•	•		•	•			•	•	•					•			•						•				•	•							
	Kom Ombo	19.4	63	T	•	•	•		•		•			•		•			•						•	•						•	•							
	Kom Ombo	18.4	62	T	•	•	•	•	•		•		•												•	•				•										
	Luxor Qurna	22.4	61	T		•		•			•				•	•									•			•												
Nf.	Faiyum	2.4	57	t	•	•	•	•	•	•		•	•	•		•	•		•											•										
	along lake Qarun	5.5	56	T	•	•	•		•	•	•	•	•		•		•	•		•	•	•		•							•	•	•							
	along lake Qarun	6.6	55	T	•	•	•		•	•	•		•	•		•	•		•	•		•		•				•												
	Tamia	5.5	54	T	•	•	•	•		•				•	•			•			•	•	•	•	•			•			•									
	Tamia	24.2	53	T				•						•							•		•	•										•						
	Kom Aushem	2.4	52	t		•	•						•					•			•																			
	Kom Aushem	24.2	51	T	•			•	•	•	•				•		•								•		•	•	•	•	•									
Nv. sept.	Assiut, west	31.3	45	T			•	•	•			•	•						•									•		•										
	Assiut, west	31.3	44	t			•	•	•		•	•	•					•																						
	Assiut, west	31.3	43	T	•		•	•			•	•		•		•			•	•	•				•							•								
	Assiut, east	31.3	42	T		•	•					•		•	•	•		•			•				•				•											
	Assiut, east	31.3	41	T	•	•		•	•					•		•			•		•				•															
	Saff	27.4	40	T	•	•	•	•	•	•		•		•				•		•	•			•																
	Saff	27.4	39	T	•	•	•	•		•			•	•	•	•		•	•		•			•				•	•					•						
	Saff	2.4	38	T	•	•	•		•	•	•	•		•				•	•					•																
	El Mesraf, Saff	24.3	37	V			•	•							•	•																								
	Giza	4.6	36	T	•	•	•	•	•		•	•	•	•	•							•		•				•		•										
	Giza	4.5	35	t	•	•	•	•	•	•	•	•	•	•		•		•	•	•		•		•			•	•				•	•							
	Dahshour Helwan	24.3	34	V		•	•	•	•		•		•	•										•																
	Mit	24.3	33	t	•	•	•	•	•	•	•	•	•	•	•						•	•	•	•			•	•			•			•						
	Mit Rahine	24.3	32	T	•	•	•	•	•	•	•	•	•	•	•	•	•		•								•													
	Saqqarah rd	24.3	31	T	•	•	•		•	•	•	•		•	•									•	•	•	•		•											
Nd	Inshas	3.3	17	T	•		•	•		•	•	•			•							•	•											•						
	Quesna	7.4	16	T	•				•	•		•		•		•		•		•				•																
	Quesna	7.4	15	t		•	•	•					•						•			•		•			•	•		•										
	Quesna	7.4	14	t	•	•	•		•		•		•	•	•	•	•		•									•	•					•						
	Qusuk	7.4	13	T				•	•	•	•	•	•	•			•			•		•																		
	Edfina	7.4	12	T	•			•	•	•	•	•	•				•		•	•	•		•						•	•										
	Edfina	7.4	11	T	•			•	•	•			•			•			•	•									•											
Hme.	Burg El Arab	6.4	7	H		•		•				•		•						•															•		•	•		•
	Burg El Arab	6.4	6	H				•		•	•				•			•					•								•				•		•			
	Burg El Arab	6.4	5	H					•		•				•			•			•					•					•				•	•	•	•	•	
	Burg El Arab	6.4	4	H				•	•	•	•					•				•	•										•				•	•	•	•	•	•
	Burg El Arab	6.4	3	M		•				•								•					•														•	•		•
	Burg El Arab	10.3	2	T	•									•						•							•				•				•		•			
	Amira	10.3	1	T	•	•	•	•	•	•	•																				•					•	•			
	Species number (winter)				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36


37 Koeleria phleoides (Vill.) Pers.
38 Bupleurum subovatum Link
39 Filago spathulata Presl.
40 Lathyrus pseudocicera Pamp.
41 Plantago albicans L.
42 Roemeria hybrida (L.) DC.
43 Salvia lanigera Poir.
44 Thymelaea hirsuta (L.) Endl.
45 Carduus getulus Pomel
46 Carrichtera annua (L.) Asch.
47 Herniaria hemistemon J. Gay
48 Onobrychis crista-galli (L.) Lam.
49 Scorzonera alexandrina Boiss.
50 Centaurea alexandrina Del.
51 Centaurea glomerata Vahl
52 Cutandia dichotoma (Forssk.) Batt. & Trab.
53 Adonis dentata Del.
54 Anacyclus alexandrinus Willd.
55 Linaria haelava (Forssk.) Del.
56 Matthiola humilis DC.
57 Peganum harmala L.
58 Reseda decursiva Forssk.
59 Erucaria microcarpa Boiss.
60 Trigonella maritima Del.
61 Setaria verticillata (L.) Beauv.
62 Senecio aegyptius L.
63 Melilotus siculus (Turra) Viv.
64 Poa annua L.
65 Capsella bursa-pastoris L.
66 Brassica tournefortii Gouan
67 Spergularia marina (L.) Griseb.
68 Dianthus cyri Fisch. & Mey.
69 Imperata cylindrica (L.) Beauv.
70 Oligomeris linifolia (Vahl.) Macbr.
71 Plantago lagopus L.
72 Scirpus tuberosus Desf.
73 Cenchrus setigerus Vahl.
74 Convolvulus fatmensis Klze.
75 Convolvulus siculus L.
76 Corchorus tridens L.
77 Euphorbia aegyptiaca Boiss.
78 Geranium dissectum L.
79 Haplophyllum tangifolium Boiss.
80 Lotus arabicus L.
81 Melilotus sulcatus Desf.
82 Phalaris paradoxa L.
83 Plantago psyllium L.
84 Plantago pumila L.
85 Silene nocturna L.
86 Silene villosa Forssk.
87 Vaccaria pyramidata Medik.
88 Asphodelus fistulosus L.
89 Astragalus corrugatus Bert.
90 Erodium cicutarium (L.) L'Her.
91 Erodium malacoides (L.) Willd.
92 Lathyrus hirsutus L.
93 Thesium humile Vahl.
94 Trachynia distachya (L.) Link

Region	Locality	Date	Locality Number	Crop	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Occurrence (%)					86	63	60	66	64	60	60	45	40	40	36	36	36	36	34	28	28	28	25	25	24	24	24	22	20	19	16	14	14	11	11	11	10	8	8	5	8	5	8	3	3	6
O	Dakhla, w of Mawhoub 2	17 8	95	S																																										
O	Dakhla, w of Mawhoub 1	17 8	94	X		•																	o					•													•		•			
O	Dakhla, Bedkhlou	16 8	93	X	•	•		•		•	•	•		•	•	•			•							•		•						•		•	•									
O	Dakhla, Mot	17 8	92	S	•	•	•	•			•	•		•	•				•										•				•										•			•
O	Baris, Ein Mager	15 8	91	S	•	•					•					•												•					•													
O	Baris 3	15 8	90	S	•	•		•	•					•	•							•						•													•			•	•	
O	Baris 2	15 8	89	G	•	•		•	•			•		•	•							•				•							•										•			
O	Kharga - Baris, Genah 7	15 8	88	X	•										•	•																														
O	Kharga - Baris, Genah 8	16 8	97	X	•	•	•					•		•				•								•	•		•							•										
O	Kharga, Hibis temple	13 8	96	X	•	•	•					•		•	•			•		•	•			•		•	•		•						•	•						•				
O	Kharga, rest house	13 8	85	X		•									•											•																				
O	Kharga, rest house	13 8	84	X	•	•		•		•		•						•								•										•										
O	Wadi Natroun	21.9	83	Z								•		•				•	•					•						•													•			
O	Wadi Natroun	21 9	82	Z	•	•	•		•			•	•		•		•		•																	•										
O	Wadi Natroun	21 9	81	S	•	•	•		•									•	•		•			•																						
Nv mer	Aswan, Nag el Gaalab	1 7	72	Sv	•		•		•		•	•	•	•		•			•	•				•	•		•	•	•	•		•														
Nv mer	Aswan, Nag el Gaalab	1 7	71	Sv	•	•	•	•		•	•	•	•	•				•	•				•	•		•	•	•				•		•				•				•				
Nv mer	El Khattarah	4 7	70	Sv	•	•	•		•	•	•		•	•		•											•	•				•														
Nv mer	El Qasra	2 7	69	Sv	•	•	•	•	•		•							•		•				•																						
Nv mer	Kom Ombo	29 6	68	O	•	•	•			•	•	•	•									•	•		•			•					•	•							•					
Nv mer	New Nubia - Silsila	2 7	57	Sv		•	•	•		•			•	•		•		•			•					•			•																	
Nv mer	New Nubia - Silsila	2 7	56	Sv		•	•	•		•	•	•	•	•	•	•		•	•	•	•				•				•				•			•										
Nv mer	Silwa, Nile bank	29 6	55	S	•	•	•			•	•		•	•		•								•	•								•													•
Nv mer	Silwa, Nile bank	29 6	64	Sv	•	•	•	•	•	•	•	•	•	•	•			•	•	•	•	•				•	•	•														•				
Nv mer	Silwa island	29 6	63	Z	•		•	•	•		•	•	•				•	•	•		•						•		•					•												•
	Silwa island	29 6	62	Sv	•	•	•	•	•	•			•	•	•			•			•	•	•	•		•						•	•													
	Silwa island	29 6	61	Sv S	•	•	•		•	•	•	•	•	•					•	•				•			•	•	•						•											
Nf.	Kom Osheem	13 10	57	Z	•	•	•	•		•	•			•		•	•		•	•	•			•			•																			
Nf.	Gharak Sultani	6 10	56	Z	•	•	•	•	•	•	•		•	•		•	•			•																										
Nf.	Abu Ghandeer	6 10	55	Z	•	•	•	•		•	•		•		•	•	•			•		•						•	•								•									•
Nf.	Fidemeen	11 8	54	G	•	•	•	•	•	•	•	•	•		•		•	•			•	•	•	•		•	•	•							•											
Nf.	Tamia	11 8	53	Z		•	•					•					•					•					•																			
Nf.	Tamia	11 8	52	G	•	•	•	•	•	•	•				•	•	•					•																								
Nf.	Tamia	11 8	51	S	•	•	•	•		•	•			•		•	•				•										•															
Nv. sept.	Assiut, east	23 7	42	Z	•	•	•	•		•	•	•				•	•	•		•		•				•		•		•				•									•			
Nv. sept.	Assiut, east	23 7	41	G	•	•	•	•	•	•	•	•			•	•						•	•			•																				
Nv. sept.	Assiut, west	21 7	40	Z	•	•	•	•	•		•		•			•			•			•			•	•		•		•														•		
Nv. sept.	Assiut, west	21.7	39	G	•	•	•	•	•	•	•	•	•		•	•	•			•		•	•		•					•																
Nv. sept.	Mallawi	29 7	38	Z	•	•	•	•	•	•																																				
Nv. sept.	Mallawi	29 7.	37	Z	•	•	•	•	•	•	•		•		•		•					•			•																					
Nv. sept.	Maghagheh	29 7	36	O	•	•	•	•	•	•		•	•					•				•			•																					
Nv. sept.	Maghaghah	29 7	35	Z	•	•	•		•	•					•																		•							•						
Nv. sept.	Beni Suef	29 7	34	Z	•	•	•	•	•	•	•					•																							•							
Nv. sept.	Beni Suef	29 7	33	O	•	•	•	•	•	•	•		•		•	•	•		•																											
Nv. sept.	Giza, Shoubrament	23 6	32	Z	•	•	•	•	•		•					•		•													•															
Nv. sept.	Giza, pyramids rd	7 9	31	Z	•	•	•	•	•	•	•			•			•		•	•		•									•								•		•					
Nd	Abu Zaabel	31 8	22	Z		•	•	•	•	•	•		•	•				•			•			•			•			•	•	•			•			•								
Nd	Abu Zaabel	31 8	21	Z	•	•	•		•		•			•			•		•	•	•		•	•											•			•								
Nd	Mit Asem - Barrages	15 9	20	O	•		•	•	•	•	•					•	•			•			•		•						•															
Nd	Barrages	10 7	19	Z	•	•	•	•	•	•	•	•	•				•	•									•			•		•						•								
Nd	Barrages	20 10	18	Z	•			•	•	•		•			•																															
Nd	Sendyoun	15 9	17	O	•	•		•	•		•				•	•	•			•		•	•		•					•	•								•							
Nd	Ashmoun	20 10	16	O	•	•	•	•	•	•		•					•	•			•				•						•															
Nd	Ganzour	9 9	15	Z	•	•	•	•	•	•	•									•			•		•		•			•	•	•														
Nd	Sidi Ghazi	3 11	14	Z	•		•	•	•		•											•				•			•								•				•					
Nd	Talkha	16 9	13	G	•	•	•		•	•	•				•			•					•		•						•						•									
Nd	Kafr Zayat	21 9	12	O	•	•	•	•	•	•	•					•	•		•						•						•	•														
Nd	Matamir	21 9	11	Z	•	•	•	•	•	•			•	•					•	•			•	•											•											
Mma	Tahreer prov, Nasser	21 9	6	Z			•		•			•	•					•			•								•			•								•					•	
Mma	Tahreer prov, Nasser	21 9	5	O	•	•	•	•				•	•	•			•		•		•		•				•		•	•						•	•		•							
Mma	Alexandria, Abees	9 9	4	O	•										•				•				•		•									•			•		•							
Mma	Alexandria, University	28 8	3	Z	•	•	•		•	•							•	•	•		•			•						•																
Mma	Alexandria, University	28 8	2	O	•		•	•	•	•	•	•					•				•									•				•												
Mma	Alexandria, Maamoura	26 8	1	Z	•	•	•	•	•	•	•	•		•				•	•	•	•		•	•					•				•		•			•		•						
Species number (winter)						2		10				3	28						23								7		4				29	24							8	9	12	13	14	15

TABLE 2

Records of distribution of summer weeds
(June Nov 1967)

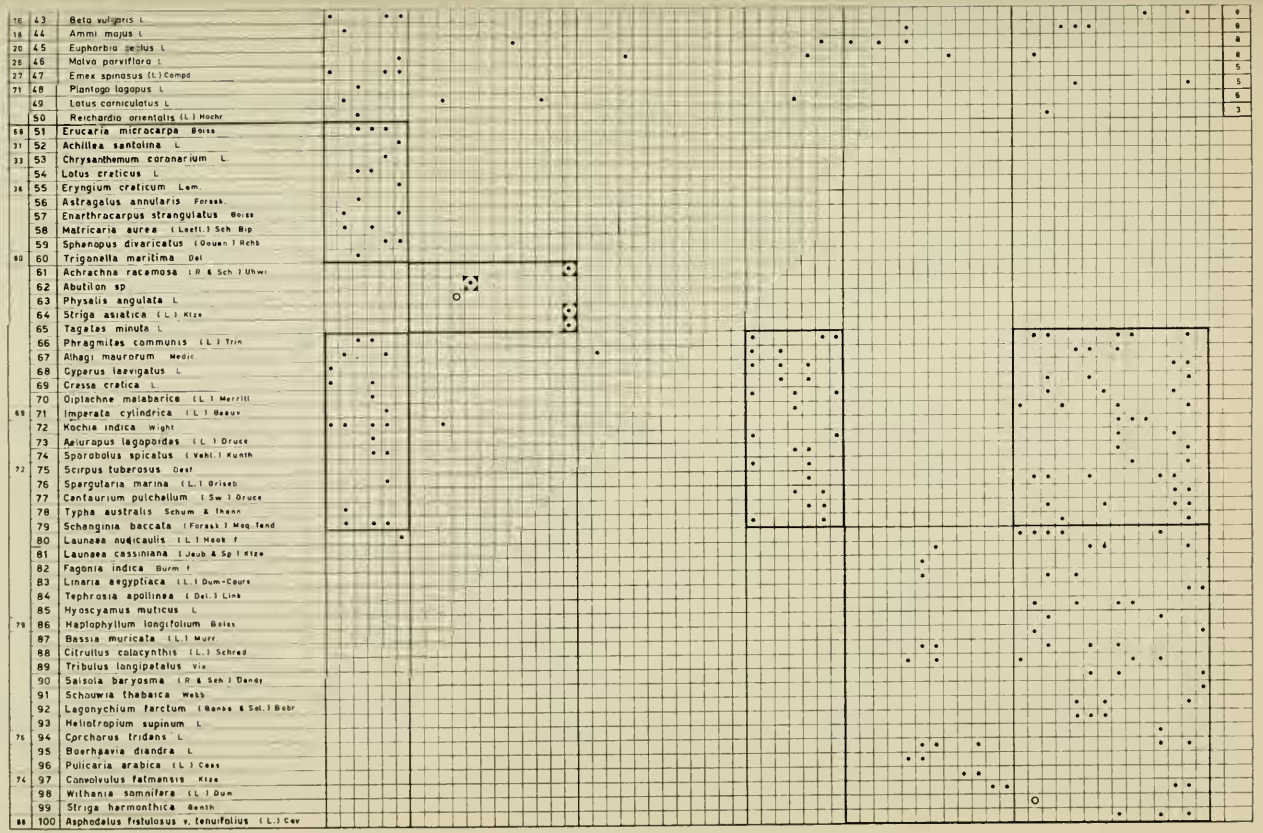
G = Gossypium barbadense L
S = Sorghum durra Stapf
v = Vigna sinensis Savi
X = Vegetables.
Z = Zea mays L.

o = new record to phytogeog region of Egypt
⁘ = new record to Egypt.

Locality Number
Crop.

Species number (summer):

1. Echinochloa colonum (L) Link
2. Cynodon dactylon (L) Pers
3. Portulaca oleracea L
4. Convolvulus arvensis L
5. Amaranthus ascendens Lois
6. Cyperus rotundus L
7. Corchorus olitorius L
8. Sonchus oleraceus L
9. Solanum nigrum L
10. Amaranthus angustifolius Lam
11. Sesbania sesban (L) Merrill
12. Brachiaria eruciformis (Sibth u Sm) Griseb
13. Dinebra retroflexa (Forssk) Panz
14. Eragrostis cilianensis (All) Vign - lut
15. Erigeron crispus Pourr
16. Euphorbia prunifolia Jacq
17. Setaria viridis (L) Beauv
18. Hibiscus trionum L.
19. Amaranthus paniculatus L
20. Digitaria sanguinalis (L) Scop
21. Sida alba L
22. Sorghum virgatum (Hack) Stapf
23. Chenopodium album L
24. Euphorbia aegyptiaca Boiss
25. Chenopodium murale L
26. Xanthium brasilicum Vellozo
27. Urochloa reptans (L) Stapf
28. Gynandropsis gynandra (L) Briq
29. Polygonum equisetiforme Sibth u Sm
30. Cichorium pumilum Jacq
31. Dactyloctenium aegyptium (L) Richt
32. Eragrostis pilosa (L) Beauv
33. Echinochloa crus-galli (L) Beauv
34. Amaranthus chlorostachys Willd
35. Xanthium spinosum L
36. Panicum repens L
37. Brassica nigra (L) Koch
38. Polypogon monspeliensis (L) Desf
39. Medicago hispida Gaertn
40. Lolium perenne L
41. Avena fatua L
42. Rumex dentatus L.


16 43 Beta vulgaris L.
18 44 Ammi majus L.
20 45 Euphorbia peplus L.
26 46 Malva parviflora L.
27 47 Emex spinosus (L.) Compd.
71 48 Plantago lagopus L.
49 Lotus corniculatus L.
50 Reichardia orientalis (L.) Hochr.
69 51 Erucaria microcarpa Boiss.
31 52 Achillea santolina L.
33 53 Chrysanthemum coronarium L.
54 Lotus creticus L.
38 55 Eryngium creticum Lam.
56 Astragalus annularis Forssk.
57 Enarthrocarpus strangulatus Boiss.
58 Matricaria aurea (Loefl.) Sch. Bip.
59 Sphenopus divaricatus (Gouan) Rchb.
80 60 Trigonella maritima Del.
61 Achrachna racemosa (R. & Sch.) Uhwi.
62 Abutilon sp.
63 Physalis angulata L.
64 Striga asiatica (L.) Kize.
65 Tagetes minuta L.
66 Phragmites communis (L.) Trin.
67 Alhagi maurorum Medic.
68 Cyperus laevigatus L.
69 Cressa cretica L.
70 Diplachne malabarica (L.) Merrill
69 71 Imperata cylindrica (L.) Beauv.
72 Kochia indica Wight
73 Aeluropus lagopoides (L.) Druce
74 Sporobolus spicatus (Vahl.) Kunth
72 75 Scirpus tuberosus Desf.
76 Spergularia marina (L.) Griseb.
77 Centaurium pulchellum (Sw.) Druce
78 Typha australis Schum. & Thonn.
79 Schanginia baccata (Forssk.) Moq. tend.
80 Launaea nudicaulis (L.) Hook. f.
81 Launaea cassiniana (Jaub. & Sp.) Kize.
82 Fagonia indica Burm. f.
83 Linaria aegyptiaca (L.) Dum-Cours.
84 Tephrosia apollinea (Del.) Link.
85 Hyoscyamus muticus L.
79 86 Haplophyllum longifolium Boiss.
87 Bassia muricata (L.) Murr.
88 Citrullus colocynthis (L.) Schred.
89 Tribulus longipetalus Viv.
90 Salsola baryosma (R. & Sch.) Dandy
91 Schouwia thebaica Webb.
92 Lagonychium farctum (Banks & Sol.) Bobr.
93 Heliotropium supinum L.
76 94 Cyrcharus tridens L.
95 Boerhaavia diandra L.
96 Pulicaria arabica (L.) Cass.
74 97 Convolvulus fatmensis Kize.
98 Withania somnifera (L.) Dun.
99 Striga harmonthica Benth.
88 100 Asphodelus fistulosus v. tenuifolius (L.) Cav.
0 0 0 0 5 5 6 3

cludes the Mediterranean strip of the delta. These reclaimed lands follow a permanent system of irrigation with the Nile water as the principal source of irrigation.

Within these recently cultivated areas, a weed flora is developed and established, and may differ in several aspects from those in adjacent regions of older cultivation, i. e. Nv and Nd. It may be of interest to follow the development of the recent weed flora in these areas in order to include them in the phytogeographical regions of the adjacent territories or to propose others of their own. El Hadidi and Ghabbour (1968) proposed a sub-region, the Nile Nubia (Nn?), which would include the part of the Nile valley region starting from Kom Ombo southwards till the Sudanese Nubian land. The same may apply to the new areas of cultivated land extending along the eastern and western sides of the delta: Ns? (for Salhia) and Nt? (for Tahrir), as new phytogeographical sub-regions may be justified. Reclamation of land is taking place also in the Oases depression including Kharga and Dakhla oases: the New Valley project (in map). Here underground water is the source of permanent irrigation system for the reclaimed land. The Oases region is no more a region isolated from the reach of other floristic elements. With the introduction of crops from other regions of Egypt, many new records for weeds in the Oases took place.

4) Changes in enviromental conditions would result in a continuous change of the native plant cover. This may explain the high complexity of the weed flora of Egypt. Some plants which were once common are now rare or almost extinct. Several exotic species introduced in different ways are now stabilised and almost naturalized. The first author was following the behaviour of about a dozen of such ruderal species during the last 20 years. These observations will be published in a future account.

RESULTS AND DISCUSSION

Reconnaissance surveys on weeds of the cultivated land in Egypt were carried out during the period from February to November 1967 and covered the growth seasons of winter and summer crops. This allowed the study of the two sets of weeds, i. e. winter (Table 1) and summer (Table 2) weeds.

During each growth period, about 60 sample-areas representing the main cultivated land in Egypt were explored.

Latin names of the studied weeds are those used by Täckholm et al. (1956). Several standard works were consulted for the geographic distribution of the studied weeds. Among these are: Hegi's Illustrierte Flora von Mitteleuropa, Flora of Tropical Africa, Flora of East tropical Africa, Flore de l'Afrique du Nord, etc. . . .

As may be noticed from Table 1, the most common crop in permanently irrigated land during winter is wheat (T, table 1). Other important crops include broad beans and Egyptian clover (V and t respectively, table 1).

The coastal land along the Mediterranean is characterized by the rain-fed cultivation of barley (H, table 1).

Table 2 shows that the main cereal crop during summer months is maize (Z, table 2). This is usually replaced in southern provinces of Upper Egypt (Nv mer.) and the Oases by the warmth requiring millet (S, table 2). It is customary to have an associate crop in the same field which is cherry bean or cow-pea (v, table 2). Cotton (G, table 2) is cultivated on a larger scale in the delta and the northern provinces of Upper Egypt (Nv sept.). It is shown in table 2 that cotton is cultivated in some newly reclaimed areas of Tahrir province (locality no. 5), New Nubia (locality no. 68) and New Valley (locality no. 89).

As it may be noticed from the records of Table 1 and 2, there is a group of weeds (species numbers 1—30, table 1 and species numbers 1—50, table 2) which are met with in all the phytogeographical regions under investigation.

Winter weeds of very common occurrence (above 40%) are:

Melilotus indicus (L.) All.
Cynodon dactylon (L.) Pers.
Sonchus oleraceus L.
Chenopodium murale L.
Trifolium resupinatum L.
Anagallis arvensis L.
Chenopodium album L.
Brassica nigra (L.) Koch
Polypogon monspeliensis (L.) Desf.
Convolvulus arvensis L.

Most of these are native of the Mediterranean region, while *Cynodon*, *Sonchus* and *Chenopodium album* are generally met with in the warm and temperate regions of the world. These three weeds have the tendency to continue their growth during the summer months in Egypt. New seedlings of *Sonchus* and *Chenopodium* appear during early summer, *Cynodon* seems to perennate throughout the whole year.

Summer weeds that are of very common occurrence (above 40%, table 2) include:

Echinochloa colonum (L.) Link
* *Cynodon dactylon* (L) Pers.
Portulaca oleracea L.
* *Convolvulus arvensis* L.
Amaranthus ascendens Lois.
Cyperus rotundus L.
Corchorus olitorius L.
* *Sonchus oleraceus* L.
* *Solanum nigrum* L.
Amaranthus angustifolius Lam.

The weeds preceeded with * may also be met with during winter months, although may be less common e. g. *Convolvulus* and *Solanum*. Those

are not preceeded with * are obligate summer weeds. *Echinochloa, Portulaca, Am. ascendens* and *Corchorus* are palaeotropical weeds. *Convolvulus, Cyperus,* and *Am. angustifolius* are Mediterranean, while *Cynodon, Sonchus* and *Solanum* are characteristic to the warm and temperate regions of the world.

Winter weeds of common occurrence (Table 1, occurrence 20-40%) include:

Senecio desfontainei Druce
Medicago hispida Gaertn.
Lolium perenne L.
Avena fatua L.
Rumex dentatus L.
Beta vulgaris L.
Vicia sativa L.
Ammi majus L.
Calendula micrantha Tin. et Guss.
Euphorbia peplus L.
Trigonella hamosa L.
Scorpiurus muricata L.
Erigeron crispus Pourr.
Cichorium pumilum Jacq.

Most of them are native in Mediterranean region. Only *Avena, Lolium* and *Rumex* are native of temperate regions, while *Euphorbia peplus* seems to be cosmopolitan.

Common summer weeds (Table 2, occurrence 20—40%) are:

Sesbania sesban (L.) Merrill
Brachiaria eruciformis (Sibth. et Sm.) Griseb.
Dinebra retroflexa (Forssk.) Panz.
Eragrostis cilianensis (All.) Vign.-Lut.
* *Erigeron crispus* Pourr.
Euphorbia prunifolia Jacq.
Setaria viridis (L.) Beauv.
Hibiscus trionum L.
Amaranthus paniculatus L.
Digitaria sanguinalis (L.) Scop.
Sida alba L.
Sorghum virgatum (Hack.) Stapf
* *Chenopodium album* L.
Euphorbia aegyptiaca Boiss.
* *Chenopodium murale* L.

Summer common weeds which may be met with during winter are those preceeded with *. Both *Chenopodium murale* and *C. album* were very common winter weeds, while *Erigeron crispus* was less common. The latter weed starts its growth during late spring and continues it during summer. This may explain its lower occurrence percentage among winter weeds and its

higher occurrence among summer weeds. The obligate summer common weeds include elements from tropical warm and temperate regions of both hemispheres. *Brachiaria, Sesbania, Sida, Sorghum* and *Euphorbia aegyptiaca* are palaeotropical species, while *Am. paniculatus* and *Euphorbia prunifolia* are neotropical. *Dinebra, Hibiscus* and *Setaria*, are wide-spread in warm and temperate regions of the old world, while *Eragrostis* and *Digitaria* are known from the same regions of both old and new worlds.

Less common weeds of winter (occurrence between 10-20%, table 1) are:

Vicia calcarata Desf.
Malva parviflora L.
Emex spinosus L.
Solanum nigrum L.
Polygonum equisetiforme Sibth. et Sm.

All of them except *Solanum* are Mediterranean. *Solanum* seems to be widespread in the temperate and warm regions of both hemispheres.

The less common weeds of summer (occurrence 10-20%, table 2) are:

Xanthium brasilicum Vellozo
Urochloa reptans (L.) Stapf
Gynandropsis gynandra (L.) Briq.
* *Polygonum equisetiforme* Sibth. et Sm.
* *Cichorium pumilum* Jacq.
Dactyloctenium aegyptium (L.) Richt.
Eragrostis pilosa (L.) Beauv.
Echinochloa crus-galli (L.) Beauv.

Of these, *Xanthium, Urochloa, Gynandropsis* and *Dactyloctenium* are tropical weeds of both hemispheres, while *Eragrostis* and *Echinochloa* are of wide distribution in the warm and temperate regions of the world. *Cichorium* and *Polygonum* are Mediterranean weeds which grow during winter but have the ability to continue their growth during summer.

Among the winter weeds. *Silene rubella* is rare (occurrence less than 10%) and of Mediterranean origin.

For comparison, there are more rare weeds with the occurrence less than 10% in the summer records. Most of these (species numbers 37—50, table 2) may have higher occurrence percentages during winter and are able to start a new growth season during summer months.

There are only three rare, obligate summer weeds viz.

Amaranthus chlorostachys Willd.
Xanthium spinosum L.
Panicum repens L.

All of them are of tropical origin.

Furthermore, tables 1 and 2 show certain groups of weeds which are observed only in certain phytogeographical regions.

During winter, and besides some of the common weeds mentioned earlier, a group of weeds (species numbers 31—60, table 1) are characteristic to

barley cultivations of the Mediterranean region (Mma). Most of these species are typical Mediterranean, not known in Egypt outside this phytogeographical region.

During the dry summer, a few stands in this region were investigated (localities number 1—6, table 2) where permanent irrigation was introduced, and where other crops (maize and cotton) were also tried. Besides some of the common weeds characteristic of these two crops, a few Mediterranean plants (species numbers 51—60, table 2) started a new growth.

The weeds of the Mediterranean region comprise a group of halophytes and helophytes (species numbers 66—79, table 2) which are also met with in similar habitats occurring within other phytogeographical regions viz. the Nile Faiyum (Nf) and Oases (O).

During winter, another group of halophytes (species numbers 66—72, table 1) is recorded in the Nile Faiyum and Oases. Although we have not recorded them in the stands of the Mediterranean region, they are likely to be met with all over the region.

The Nile delta (Nd), is the site of a few species which are not known in other parts of Egypt. During winter, *Setaria verticillata, Sencecio aegyptius* and *Melilotus siculus* are recorded. These are native of the Mediterranean or northern temperate regions, and this may explain their difficulty to penetrate southwards.

Table 2 shows in the delta (Nd), another group of weeds which are either newly recorded in this region or even new to the flora of Egypt. Thus, *Physalis angulata* was recorded as a weed in a maize field at Sidi Ghazi, a part of the newly reclaimed lands of Kafr El Sheikh province occupying the northern part of the delta. This weed is a tropical African species and was first recorded by Boulos (1966) in the Egyptian Nubia and then later by El Hadidi and Ghabbour (1968) from the same region. Also an *Abutilon* probably of Indian origin was recorded in cotton cultivations of Ganzour in the middle part of the delta.

Three new weeds are here recorded in the cultivated fields of Abu Zaabal area north of Cairo. Of these *Striga asiatica* (L.) Ktze and *Achrachne racemosa* (R. et Sch.) Ohwi are palaeotropical species, while the third *Tagetes minuta* L. is native of tropical America, but is now spreading all over tropical Africa (Wickens, personal communication). These species may be of recent introduction in the country, or completely naturalized some decades ago. Muschler (1912) recorded *Striga lutea* Lour. (= *S. asiatica* R. Br.) and *Tagetes minuta* as Nile delta species. These two species has not been observed later and this may explain why Ramis (1929) and Täckholm et al. (1956) do not include them in their floras.

The weed flora of the cultivated land in the Oases exhibits a mixture of xerophytes *(Haplophyllum, Citrullus, Bassia, Fagonia, Schouwia, Lagonychium,* and *Tribulus* etc. .), mesophytes of tropical origin *(Boerhaavia, Convolvulus, Euphorbia* and *Corchorus* etc . .) as well as some helophytes and halophytes.

Weeds of general occurrence in all phytogeographical regions, must have found their way to the Oases through the continuous introduction of new crops. Table 1, shows a small group of plants (species numbers 92—94) which are common to both of the Mediterranean and Oases regions. This can be attributed to the introduction of barley from Mariut districts (Mma, compare TÄCKHOLM and DRAR 1954, under *Leopoldia comosa).* Afterwards, a rather large number of Mediterranean species were observed in this region, of these some (species numbers 83—91) are now naturalized.

Cultivations in the newly reclaimed areas (New Valley project), would show several aspects in the invasion with the weed flora. In West of Mawhoub district in the northern west limits of Dakhla oasis, two neighbouring localities were visited. Locality number 94 (Table 2) was cultivated for the first time in the previous winter season with some vegetables, while locality number 95 (Table 2) was cultivated for the first time during the summer season 1967 with millet. This recently cultivated field was completely weed-free. For comparison, locality number 94 showed few weeds of general occurrence, viz., *Cynodon dactylon, Euphorbia aegyptiaca, Amaranthus paniculatus, Brassica nigra* and *Medicago hispida.*

This shows that *Cynodon* is one of the early invaders of cultivated lands. *Brassica* and *Medicago* are winter weeds that have been introduced to this area during its first cultivation in the preceding winter. *Amaranthus paniculatus* appearing in this locality denotes its first record in the whole Oases region. In addition, this locality comprised some desert plants, viz. *Tephrosia apollinea, Bassia muricata, Salsola baryosma* and *Schouwia thebaica.* These are common desert plants which are likely to occur in this district.

A comparison between 2 closely located stands (localities number 90 and 91, table 2) in the Baris oases area may show another aspect of weed invasion. Locality number 90 (table 2) represents a newly reclaimed area which was cultivated quite recently, while locality number 91 (table 2) regresents and old site that has been cultivated since Roman times. The newly cultivated field comprised a group of weeds which are of common occurrence in other phytogeographical regions, while in the old-cultivated area, there was another set of weeds that seems to belong to the original flora of this region.

It may be pointed out here, that the root parasite *Striga hermonthica* BENTH. was recorded for the first time in the Oases in a maize field in a recently reclaimed area at Wadi Natroun (locality no. 82, table 2). Broad beans seeds which are ought to be cultivated in the Oases region are subjected to special treatment to destroy any accompanied *Orobanche* seeds. This explains the absence of this root parasite in the Oases region, up to the present.

The weed flora of the cultivated land in the southern extremity of the Egyptian Nile Valley region (Aswan, Nn?) agrees with that of the Oases in having a proportion of typical desert plants. From the early beginning, this part of the cultivated land of the Nile Valley was represented by a very narrow strip of sandy soil which belonged to the adjacent Arabic desert, and

which is now extending eastwards to form the so-called "New Nubia" land reclamation project.

The authors are aware of the fact, that the weed flora of Egypt needs still comprehensive work and discussion, which are however beyond the limits of this preliminary survey and will be left therefore for future studies.

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